


XNG MOBILE DISPENSER TRAILER

OPERATOR QUICK START GUIDE

Press the  button in the upper left hand corner for detailed instructions.

1. Connect hose to target vehicle.
2. Login with XNG credentials.
3. Enter Vehicle # and Trailer #.
4. Press START to begin flow.
5. Return nozzle to holder when finished.

Legend	Fill Status (Green)	Flow Status (Amber)	ESD/Fault (Red)
Initializing	Solid	Solid	Solid
Faulted	-	-	Flashing
Idle	-	Solid	-
Authorized, not started	Flashing	Solid	-
Flowing	Solid	Solid	-
Low flow	Solid	Flashing	-
Low flow, timeout warning	Flashing	Flashing	-

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1.0 TYPE OF SYSTEM

- 1.1 The PLC is an IDEC FC6A-D16R4CEE system performing configuring, monitoring, reporting of shutdown, pressures, and temperatures to a local 7" Redlion CR3000 Series HMI touch display. All user configurable variables can be entered into the PLC via the local HMI touch display. The panel is powered by a customer supplied 120vac, and supplied with Internet access by a customer supplied router. Throughout this manual the controller is referred to as PLC.

2.0 SPECIAL PROVISIONS

- 2.1 In case of temperature probe failure, the probe can be temporarily bypassed via the **CONFIG > TEMP SETTINGS** screen, which requires an elevated user to be logged in.. The user will enter the current ambient temperature in degrees Fahrenheit and toggle the bypass on. It will remain on until the user toggles it off or after 24 hours have passed, at which point the user will need to enter a new ambient temperature and toggle it back on.
- 2.2 In case of flow meter communication failure, this fault can be temporarily disabled via the **CONFIG > FORCES** screen, which requires an elevated user to be logged in. This will allow normal operation of the dispenser trailer, although the Flow Status LED will no longer inform the user of when to switch banks.
- 2.3 The power for the solenoid valve, Fill Status LED and Flow Status LED are tied into the ESD loop.

3.0 MANUAL/REMOTE OPERATION

- 3.1 **MANUAL (HMI BASED)** - The unit is started manually by first logging in using the XNG credentials and pressing the **VEHICLE/TRAILER ENTRY** virtual button on the main dashboard, entering the appropriate vehicle and trailer ID#, pressing enter and then pressing either the virtual start button on the main dashboard or the physical start pushbutton located just below the HMI.
- 3.2 **REMOTE (HMI BASED)** – The unit is started remotely by first connecting to **192.168.165.20** and clicking the Remote Connection link. This will open a webpage that contains the HMI screen exactly as it appears physically, and can be interacted with by clicking on the screen.
- 3.3 **REMOTE (PLC BASED)** – A transaction can be authorized remotely by first connecting to **192.168.165.1** and entering the correct username and password. This will open a webpage that allows a remote operator to enter the vehicle and trailer ID# and authorize either a single transaction or toggle authorization so that multiple transactions can be started using the same input data. The on-site operator must then press either the virtual

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start button on the main dashboard or the physical start pushbutton located just below the HMI.

4.0 POWER UP AND READY TO START

- 4.1** When the 120vac ON/OFF switch is in the ON position AND the 24vdc ON/OFF switch is in the ON position, OR if only the 24vdc ON/OFF switch is in the ON position and the 24vdc battery is charged the PLC and HMI will power on. The PLC will begin scanning, all LEDs will flash for a moment, and the local HMI will display any alarms or shutdowns that have occurred. After the operator has corrected all shutdown conditions the LEDs will show a solid amber as the dispenser trailer is idle.

5.0 BANK SHIFT INDICATION

- 5.1** When the PLC is powered on and a transaction is in progress the Flow Status LED will begin to flash when the flow rate drops below a set point, indicating that it is time for the operator to switch banks. If the flow rate does not rise above this set point after a set amount of time the transaction will end automatically and be marked as an incomplete fill (***STOP CODE 11***).
- 5.2** Both the bank shift indication set point and the bank shift timeout can be manually changed by an operator by first pressing the **CONFIG** button located on the main dashboard, then pressing the **MISC** button and locating the set point for each value.

6.0 STOP SEQUENCE

6.1 NORMAL SHUTDOWN SEQUENCE

- 6.1.1** A transaction can be ended at any time by pressing the **STOP/RESET** pushbutton located on the control panel or by pressing the virtual **STOP/RESET** pushbutton located on the main dashboard (***STOP CODE 12***).
- 6.1.2** A transaction will end automatically when the **FINAL TARGET** pressure has been met for the fill target. More information about the target pressure can be found in section 8.0 (***STOP CODE 10***).
- 6.1.3** A transaction will end automatically if the flow rate remains below the **BANK SHIFT INDICATION** setting for longer than the **BANK SHIFT TIMEOUT** setting. (***STOP CODE 11***).

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6.2 FAULT SHUTDOWN SEQUENCE

6.2.1 If a shutdown condition occurs, the active transaction will end immediately and the inlet valve will be de-energized. The Flow Status and Fill Status LEDs will remain off and the ESD/Fault LED will flash the current fault code while the system is in a faulted state. A new transaction cannot be started while the system is in a faulted state. The HMI will indicate the current fault on the main dashboard and on the **ALARM** page.

6.2.2 Once the shutdown condition has been corrected an operator can press the **STOP/RESET** pushbutton located on the control panel or the virtual button on the main dashboard to clear the fault. If no other fault condition exists the ESD/Fault LED will cease flashing and the Flow Status LED will become solid. A new transaction can be initiated.

6.3 ESD SHUTDOWN SEQUENCE

6.3.1 If either of the physical ESD buttons are pressed, the remote ESD loop will be de-energized and the Fill Status LED, Flow Status LED and solenoid valve's common positive will be de-energized regardless of the current state of the PLC. Any active transaction will end and the HMI will display a remote ESD fault. The ESD/Fault LED will flash the current fault code.

6.3.2 If the virtual ESD button located in the bottom right corner of every screen is pressed, the Fill Status LED, Flow Status LED and solenoid valve will be de-energized provided the PLC is functional. Any active transaction will end and the HMI will display a virtual ESD fault. The ESD/Fault LED will flash the current fault code.

7.0 DISPENSER VALVE ACTUATION

7.1 The solenoid valve is energized after an operator logs in and enters a vehicle and trailer ID then presses the **START** button located on the main dashboard or presses the physical pushbutton on the control panel.

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7.2 8.0 TEMPERATURE COMPENSATION

8.1 The PLC uses a temperature compensation formula to determine the pressure at which to consider a fill completed and end the active transaction.

$$P_T = (((T - T_s) * 16.6) + P_s)$$

$$P_O = P_T * (1 + (F / 100))$$

If ($P_O > C$) then { $P_{Final} = C$ } else { $P_{Final} = P_O$ }

- P_t = **TARGET** pressure
- P_s = **FILL TO** pressure
- P_O = Target with **OVERFILL** percentage applied
- P_{Final} = **FINAL TARGET** pressure with clipping applied
- T = Current Ambient Temperature in degrees Fahrenheit
- T_s = Ambient Temperature Setpoint, in degrees Fahrenheit.
- F = Overfill percentage
- C = Clipping pressure

If FINAL TARGET pressure exceeds CLIPPING pressure then FINAL TARGET shall equal CLIPPING pressure.

9.0 ALARM AND SHUTDOWN FUNCTIONS

9.1 The PLC is capable of automatically detecting faults in the system, stopping active transactions and not allowing new transactions to be started unless the fault is resolved. It is also capable of warning alarms on the HMI screen before shutdown criteria is met. Many of these shutdowns and alarms can be disabled, though care should be taken when doing so. Never disable a shutdown or alarm without confirming that it is occurring in error, and never keep a shutdown or alarm disabled without attempting to correct the problem. There is no bounds check on shutdown or alarm parameters, so make sure they are set properly.

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- 9.2** To set up an alarm or shutdown condition, first login as an elevated user and press the **CONFIG** button located on the main dashboard, then open the **AL & SD** screen. Each setting has five parameters; Deadband, SD Low, AL Low, AL High, and SD High. The **Deadband** is the hysteresis for every alarm and shutdown for that setting. In order to prevent an alarm or shutdown from flashing between activated and deactivated constantly, the Deadband should be set to a non-zero positive number. The PLC will then only treat the alarm or shutdown as deactivated once the setting has dropped below the Setpoint – Deadband for the high AL & SD, or when it rises above the Setpoint + Deadband for the low AL & SD.
- The **SD** setpoints tell the PLC when to fault out and stop an active transaction if the reading surpasses this setpoint.
- The **AL** setpoints tell the HMI when to display an active alarm if the reading surpasses this setpoint.
- 9.3** To disable an alarm or shutdown, first press the **CONFIG** button located on the main dashboard, then open the **AL & SD** screen. Change the associated parameter for the alarm or shutdown to be disabled to zero.

FAULT #	NAME	TYPE	DISABLEABLE?
1	ESD Fault	SD	N
2	Transducer Wire Break	SD	N
3	Line Pressure High	SD & AL	Y
4	Line Pressure Low	SD & AL	Y
5	High Gas Temp	SD & AL	Y
6	Low Gas Temp	SD & AL	Y
7	High Flow Rate	SD & AL	Y
8	Modbus Communication	SD	N*
-	Thermocouple Fault	AL	N*
STOP #	NAME	TYPE	-
10	Target Pressure Reached	STOP CODE	-
11	Low Flow Timeout	STOP CODE	-
12	Stop Pushbutton Pressed	STOP CODE	-

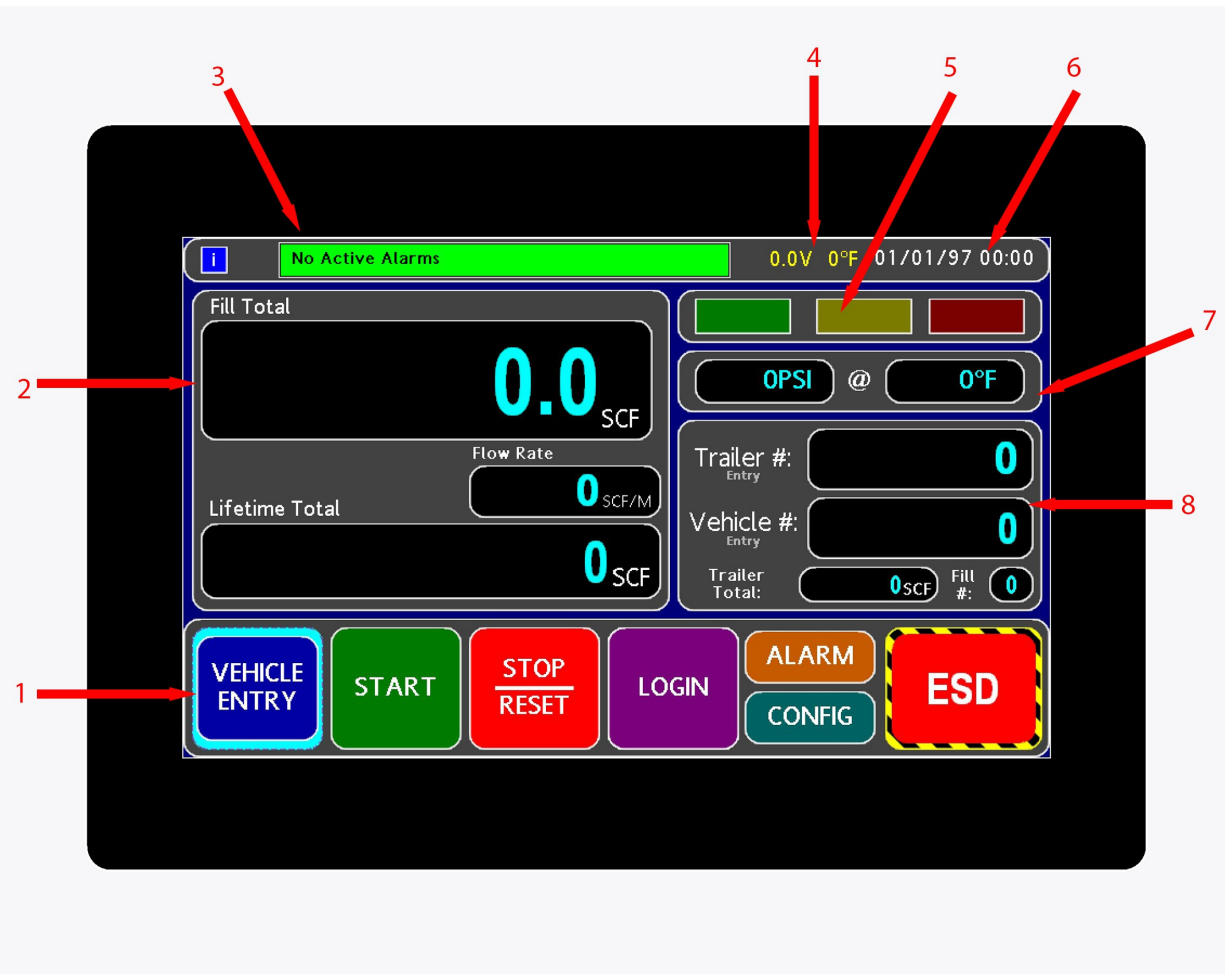
*: While these cannot be disabled permanently, they can be temporarily bypassed.

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10.0 HMI CATALOG

10.1 MAIN DASHBOARD

The main dashboard. Contains information about the active transaction, PLC state, ambient temperature, battery voltage, time and date, line pressure, gas temperature, trailer information and the current vehicle ID. Start a transaction by pressing the **VEHICLE/TRAILER ENTRY** on line 1. and confirming the current trailer ID and entering the vehicle ID. **CONFIG** and **VEHICLE ENTRY** require login.

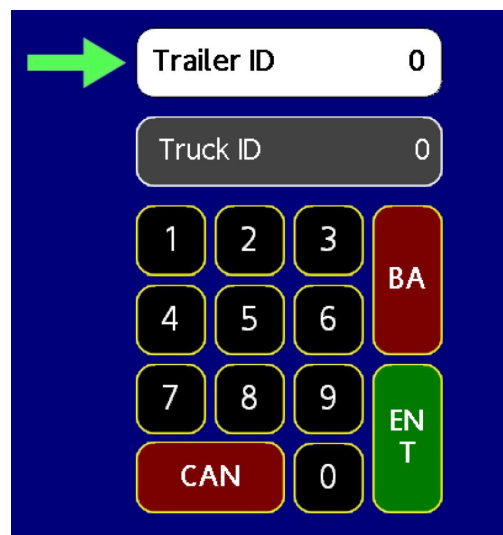
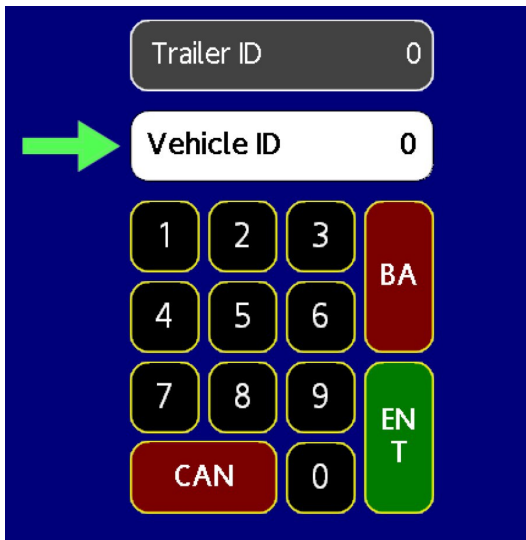


1. ID Entry, Start, Stop/Reset, Alarm, Config & ESD Bar
2. Lifetime Totalizer & Transaction Information
3. Active Alarm Display + Stop/Fault Code
4. Battery Voltage
5. LED Status Bar
6. Ambient Temperature + Date & Time
7. Current Line Pressure @ Current Gas Temperature
8. Trailer & Vehicle ID + Trailer Totalizer + # of Fills

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10.1.1 VEHICLE/TRAILER ENTRY

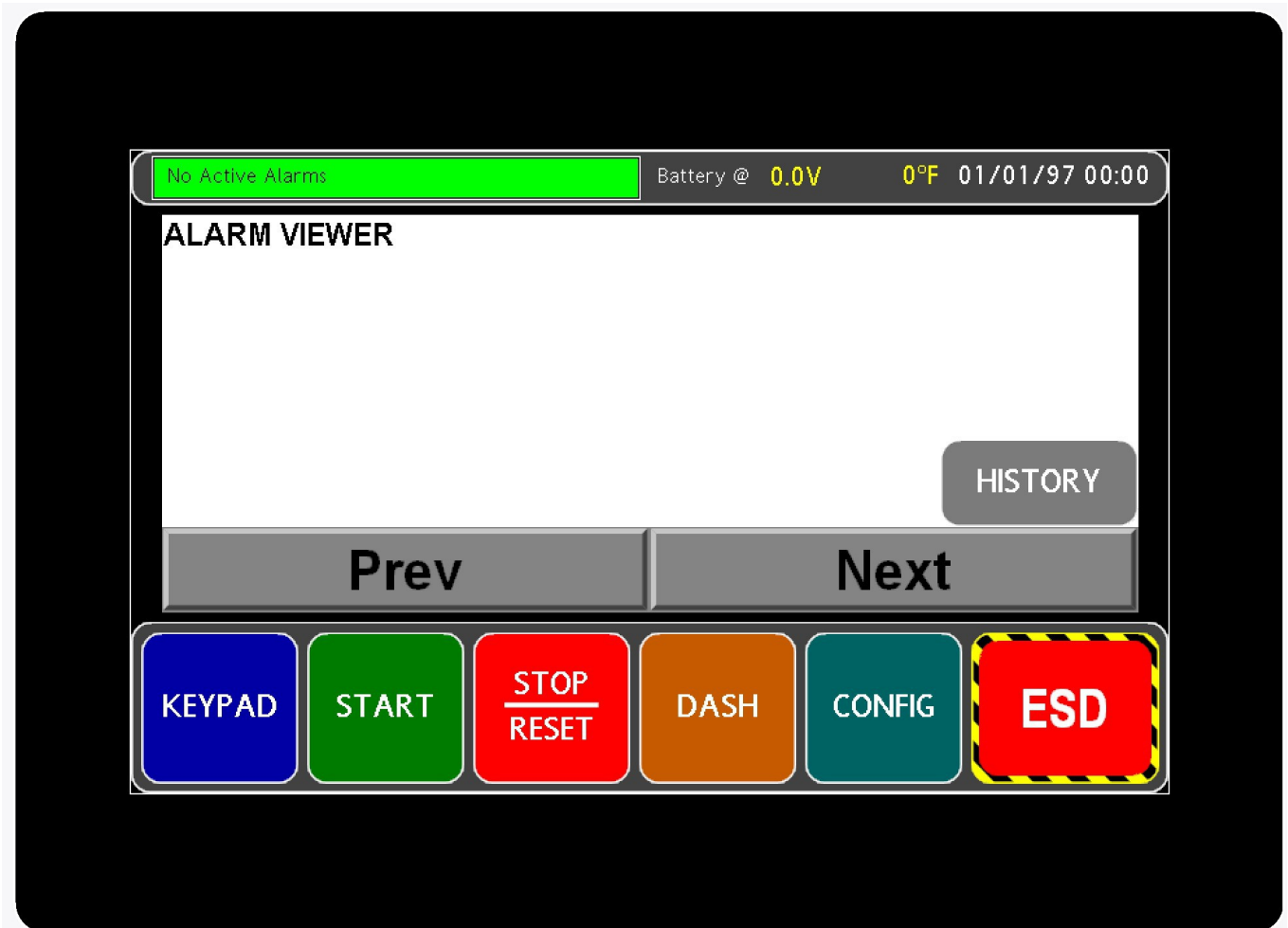
Opens when you press the **VEHICLE/TRAILER ENTRY** button on the main dashboard. A green arrow visually identifies whether you are inputting the vehicle or trailer ID. The keypad will always open with the vehicle ID selected. To change between entering the vehicle or trailer ID, simply press the dialogue box you want to change. The vehicle ID is cleared every time a new transaction is started, while the trailer ID persists between transactions and only needs to be changed if it does not match the actual trailer's ID.



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10.2 ALARM LOG

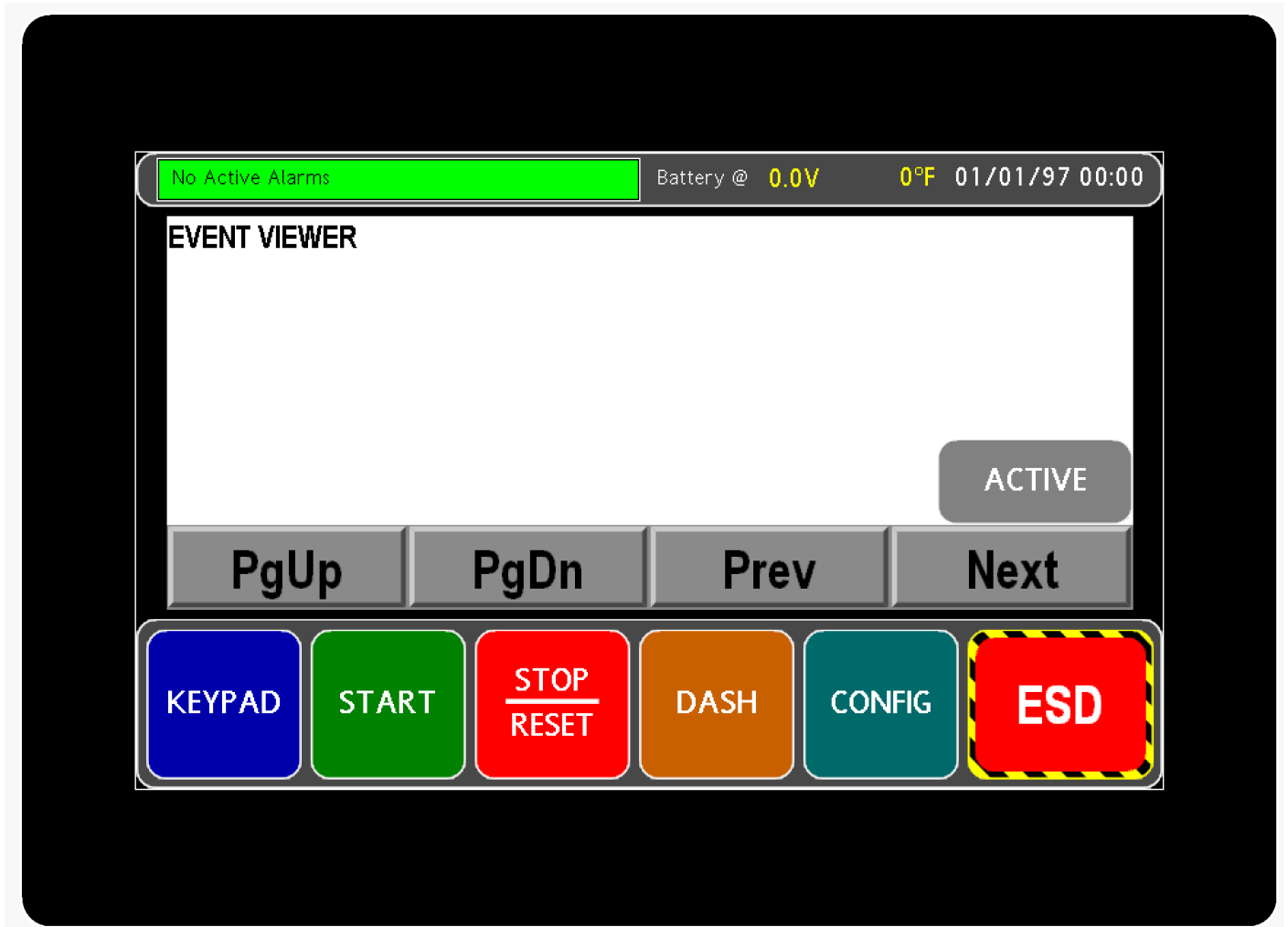
Contains information about active alarm and shutdown conditions. Alarm and shutdown conditions, once resolved, can be cleared from the PLC and Alarm Viewer by pressing the **STOP/RESET** button. View the Event Log by pressing the **HISTORY** button.



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10.3 EVENT LOG

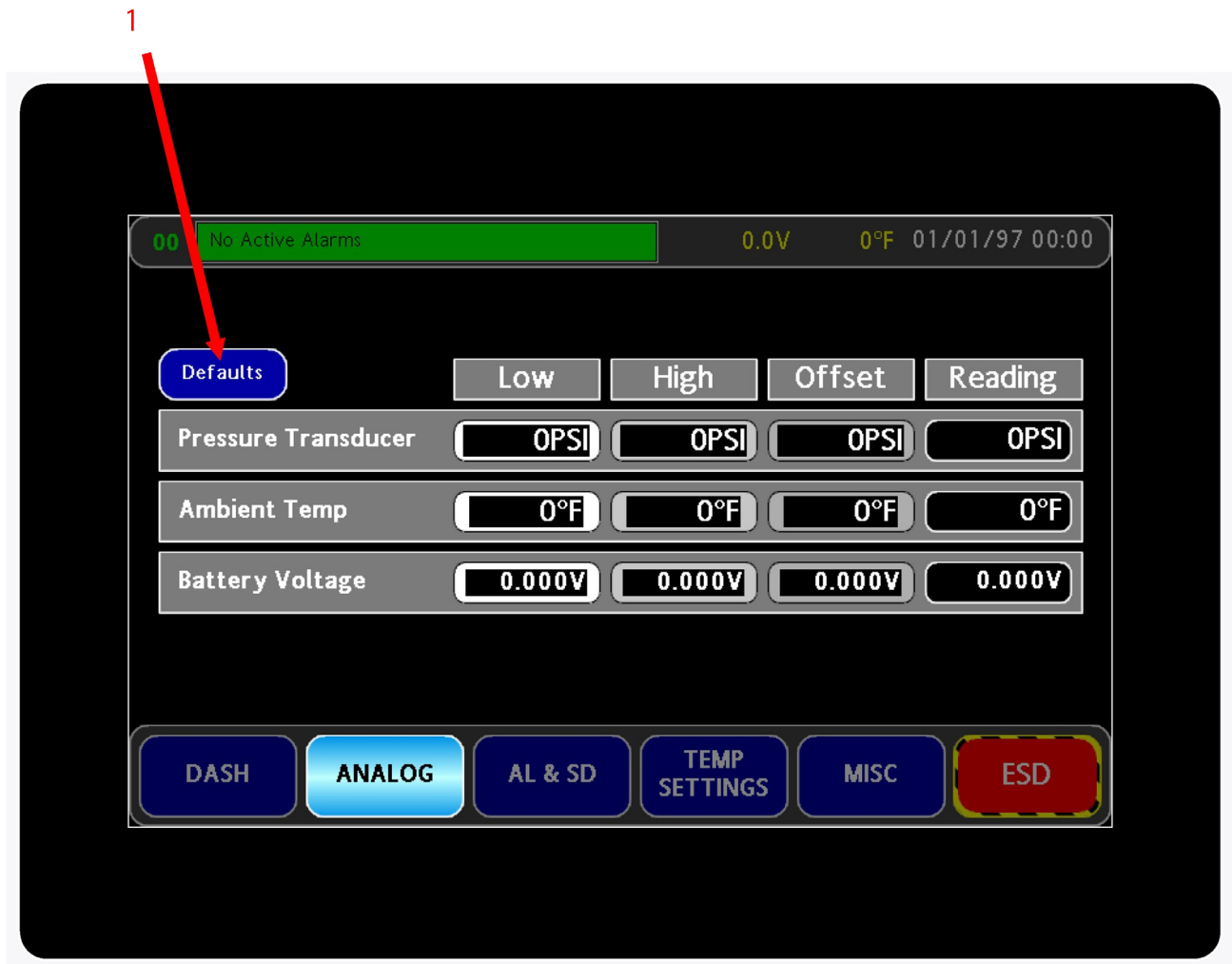
Contains information about all events. Includes transaction ends and stop codes in addition to alarms and shutdowns. Logs the time and date of each event. View the Alarm Log by pressing the



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10.4 ANALOG SETTINGS

Requires an elevated user to be logged in to access. Contains the analog scaling settings for the pressure transducer, ambient temperature thermocouple and backup battery voltage level. Ensure that these are set properly as the PLC will not function as intended if they are not. The **DEFAULTS** button (1) will load the factory defaults for each setting.

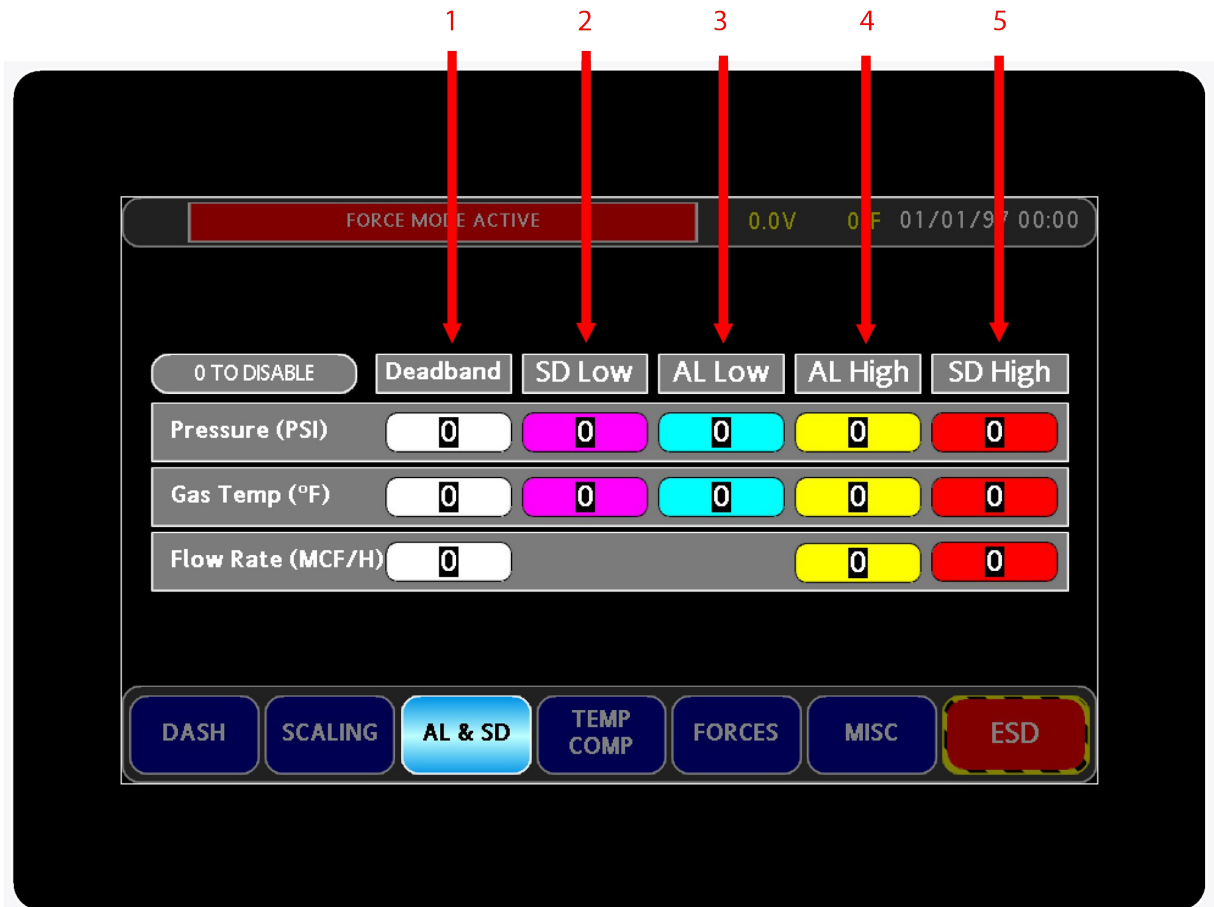


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10.4 AL & SD SETTINGS

Requires an elevated user to be logged in to access. Contains information and settings for alarm and shutdown conditions.

1. The **Deadband** is the hysteresis for every alarm and shutdown for that setting. In order to prevent an alarm or shutdown from flashing between activated and deactivated constantly, the Deadband should be set to a non-zero positive number. The PLC will then only treat the alarm or shutdown as deactivated once the setting has dropped below the Setpoint – Deadband for the high AL & SD, or when it rises above the Setpoint + Deadband for the low AL & SD.
2. The SD Low setting tells the PLC to shutdown when the reading drops below the setpoint.
3. The AL Low setting tells the HMI to alarm when the reading drops below the setpoint.
4. The AL High setting tells the HMI to alarm when the reading rises above the setpoint.
5. The SD High setting tells the PLC to shutdown when the reading rises above the setpoint.



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10.5 TEMPERATURE COMPENSATION

Requires an elevated user to be logged in to access. Contains information and setting about the temperature compensation algorithm.

1. Ref Press is the pressure at which the transaction will be considered complete. Must be between 1200 PSI and 4300 PSI.
2. Ref Temp is the ambient temperature applied to the Ref Press. This should be 70°F unless a specific fill pressure at a specific temperature is desired. Must be between 50°F and 125°F.
3. TEC% is the thermal expansion compensation percentage. It applies a flat % increase to the fill pressure to account for changing gas temperatures during a fill. Must be between 0% and 10%.
4. Offset
5. Stop Press is the clipping pressure. If the Target pressure would be above the clipping pressure due to temperature compensation, it is instead set to the clipping pressure. Must be between 125% and 75% of the Ref Press.
6. Target is the final target pressure of the temperature compensation algorithm. Active transactions will end automatically and be marked as complete once the line pressure is equal to or greater than the target pressure.

FORCE MODE ACTIVE 0.0V 0°F 01/01/97 00:00

Temperature Compensation	Ref Press	@	Ref Temp	Target
OFF	0		0	0

Stop Delay	TEC%	Offset	Stop Press
0	0	0	0

Temperature Probe Override	Setpoint
OFF	0

24HR LIMIT

DASH SCALING AL & SD TEMP COMP FORCES MISC ESD

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10.6 MISCELLANEOUS SETTINGS

Requires an elevated user to be logged in to access. Contains various information and settings.

1. During an active transaction, if the flow rate drops below the Bank Shift Indication setting the Flow Status LED will begin to flash to indicate to an operator that it is time to switch banks.
2. During an active transaction, if the flow rate drops below the Bank Shift Indication settings and does not rise before the Bank Shift Timeout setting, the transaction will end and be marked as a Low Flow Timeout (**STOP CODE 11**)
3. A transaction is considered authorized once the vehicle ID has been entered and the trailer ID confirmed. If a transaction is not started before the Auth Timeout setting, the authorization will be cleared and will need to be entered again.
4. The CNG Mol Weight setting allows the PLC to display the totalizers correctly. While the HMI shows the flowmeter totalizers in SCF, the flowmeter itself records them in lbs. In order to convert accurately, the molecular weight of the gas is required. The formula used is as follows:

$$V(\text{SCF}) = W * 379.3 / \text{MW}$$

Where W is the total mass in lbs and MW is the molecular weight of the gas in lbs/lb-mole. If the MW of the gas changes after the mobile dispenser trailer has been used for one or more fills, the HMI will not display an accurate record of the volume flowed. However, the flowmeter WILL keep an accurate record of the mass that has flowed through it.

